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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,574	09/27/2006	Motohisa Kamijo	040356-0595	6805

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FOLEY AND LARDNER LLP  
SUITE 500  
3000 K STREET NW  
WASHINGTON, DC 20007

EXAMINER
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AKRAM, IMRAN

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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10/13/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/594,574	<b>Applicant(s)</b> KAMIJO ET AL.	
	<b>Examiner</b> IMRAN AKRAM	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 21-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/16/09</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 21-40 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.
2. While the Examiner agrees with Applicant's assertion that the Tonkovich reference fails to disclose each element of the claims as amended, the arguments presented are directed to a lack of anticipation. The new rejection below, while still making use of the Tonkovich reference, is an obviousness-type rejection. Examiner believes that within Tonkovich is motivation to modify Tonkovich to meet Applicant's claimed invention for the reasons below.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 21-37 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich (US 2003/0072699 A1).

7. Regarding claim 21, Tonkovich discloses a reforming element comprising at least one reforming catalyst passage **52** supporting a reforming catalyst **57** which generates reformat gas from fuel; a combustion element having at least one combustion gas passage **54**, which heats the reforming element by the heat of combustion gas generated by burning the hydrogen gas supplied in air introduced in said at least one combustion gas passage (paragraph 50), the reforming element and combustion element being laminated in the fuel reformer (paragraph 46); and plural supply holes arranged in a line along said at least one combustion gas passage (see figure 18), each supply hole communicating with said at least one combustion gas passage, wherein at least part of the generated reformat gas is supplied to each supply hole, and is burnt downstream of each supply hole (paragraph 121).

8. Tonkovich does not disclose that the reformer effluent is the hydrogen source for the combustion element. A source of hydrogen for the combustion element is, of course, necessary and disclosed (paragraph 50). Also disclosed are the advantages of holes along the reaction channel for reactant mixing inside the reactor (paragraph 50). It would have been obvious to one having ordinary skill in the art at the time of invention to form additional holes along and between the reforming element and combustion element of Tonkovich as done within the combustion element of Tonkovich to provide hydrogen to the combustor to heat the reforming reaction. As one of ordinary skill is aware, the holes could be created in a controllable manner and most conducive to beneficial results (ie sized to control diffusion rates). Also, Tonkovich discloses that the combustion of the combustion fuel can be a mixture of hydrogen and other hydrocarbons, so unreformed fuels entering through these apertures would not produce undesirable reactants.

9. Regarding claim 22, Tonkovich discloses that the plural supply holes are disposed at a substantially predetermined interval along said at least one combustion gas passage (see figure 18).

10. Regarding claim 23, Tonkovich discloses that the reforming element comprises a reformat gas manifold **120** collecting hydrogen (paragraph 121); and plural supply passages communicating with the reformat gas manifold, said at least one reforming catalyst passage being disposed between the supply passages (see figure 19c), the fuel reformer comprising: a partition **59** disposed between the plural supply passages and said at least one combustion gas passage, the partition having the plural supply holes in

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parts where the plural supply passages overlie or underlie said at least one combustion gas passage (see figure 19b), wherein each supply passage communicates with a corresponding one of the plural supply holes, so that the hydrogen gas of the reformat gas manifold is supplied to said at least one combustion gas passage via the supply passages and supply holes (see figure 18).

11. Regarding claim 24, Tonkovich discloses a starting material vapor manifold (paragraph 121) to which vapor of the fuel is supplied and which communicates with said at least one reforming catalyst passage (paragraph 123).

12. Regarding claim 25, Tonkovich discloses that the partition is a horizontal part provided in the combustion element or a partition plate interposed between the reforming element and combustion element, and the horizontal part and partition plate are substantially perpendicular to the lamination direction of the reforming element and combustion element (see figure 5).

13. Regarding claim 26, if Tonkovich disclosed that the reformat provided hydrogen for the manifold as is obvious or inherent in the rejection of claim 23 above, then it would have been inherent or obvious to one having ordinary skill in the art at the time of invention that the reformat gas of the reformat gas manifold of Tonkovich is supplied to said at least one combustion gas passage, thereby supplying the passages and supply holes.

14. Regarding claim 27, Tonkovich discloses that the combustion element further comprises a main passage which supplies the reformat gas to the supply passages of the reforming element, the main passage communicating with the reformat gas

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manifold via a distribution manifold **125**, and the partition is disposed between the main passage and supply passages and further comprises plural distribution holes which connect the main passage and supply passages (see figures 5, 18, and 19b).

15. Regarding claim 28, Tonkovich discloses that the distribution manifold and reformat gas manifold are configured to communicate by an external pipe of the fuel reformer (see SMR Product pipe of figure 19c).

16. Regarding claim 29, Tonkovich discloses that the supply passages of the reforming elements overlie or underlie said at least one combustion gas passage of the combustion elements (see figure 5).

17. Regarding claim 30, Tonkovich discloses that the reforming element comprises a starting material manifold **130** to which liquid fuel is supplied, and a starting material vaporization passage **134** connecting the starting material vapor manifold and the starting material manifold, the liquid fuel from the starting material manifold vaporizes in the starting material vaporization passage, and the vaporized fuel is introduced into the starting material vapor manifold (paragraph 134).

18. Regarding claim 31, Tonkovich discloses that at least one of the supply passages and at least one of the supply holes are disposed between the starting material vaporization passage and one of said at least one reforming catalyst passage closest to the starting material vaporization passage (see figure 19b).

19. Regarding claim 32, Tonkovich discloses additional fuel supply means which supplies additional fuel to at least one of the openings of the supply passages in the reformat gas manifold (paragraph 50).

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20. Regarding claim 33, Tonkovich discloses additional fuel supply means **104** which supplies additional fuel to an external pipe **118**, the external pipe communicating the distribution manifold and reformat gas manifold (see figure 19b).

21. Regarding claim 34, Tonkovich discloses that said at least one reforming catalyst passage of the reforming elements is formed by a groove, and a partition member which seals the groove (see figure 5).

22. Regarding claim 35, Tonkovich discloses that said at least one combustion gas passage of the combustion element is formed by a groove, and a partition member which seals the groove or a horizontal part of the reforming element, the horizontal part is substantially perpendicular to the lamination direction of the reforming element and combustion element (see figure 5).

23. Regarding claim 36, Tonkovich discloses that a wall surface of said at least one combustion gas passage of the combustion element supports an oxidation catalyst **53**.

24. Regarding claim 37, the pressure in the combustion element can be set lower than the pressure in the reforming element of Tonkovich. This is intended use language.

The pressure in Tonkovich is effected by process conditions. See MPEP 2114

stipulating that apparatus claims must be structurally distinguishable from the prior art.

25. Regarding claim 40, Tonkovich discloses that the starting material vapor manifold and reformat gas manifold are such that they are open to the outer circumferential surface of the fuel reformer (see figure 19b) and that the starting material vapor manifold and reformat gas manifold are sealed by their respective cover member (paragraph 143). Whether the manifolds are formed whilst lamination is product-by-



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process language. Since the physical structure of claims 24 and the structural features of claim 40 are properly rejected, then the method of forming these structures is not given patentable weight.

26. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich and Powell as applied to claim 21 above, and further in view of Powell (US 2005/0172556 A1).

27. Tonkovich does not disclose a hydrogen separation means. Powell—in an invention for a reformer with combustion heating means—discloses the use of a hydrogen separation membrane **38** for collecting hydrogen from the reformat via a reaction channel plate reactor (see figure 2). It would have been obvious to one having ordinary skill in the art at the time of the invention to include a hydrogen separation membrane as in Powell in the reformer holes of Tonkovich to collect only hydrogen from the reformat to be used as the hydrogen source for the combustor.

### ***Conclusion***

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IMRAN AKRAM whose telephone number is (571)270-3241. The examiner can normally be reached on 10-7 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Imran Akram/

Examiner, Art Unit 1795

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795